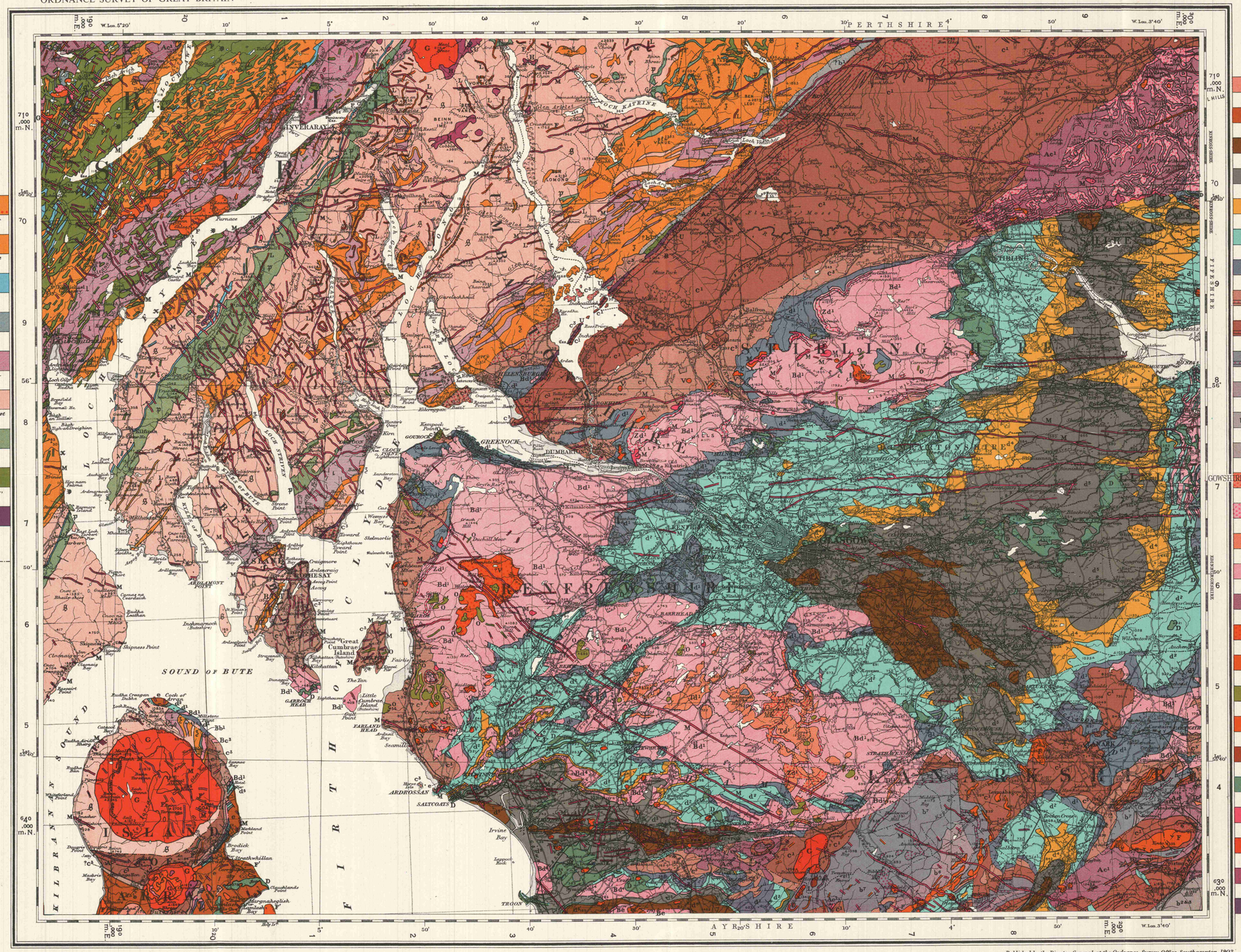
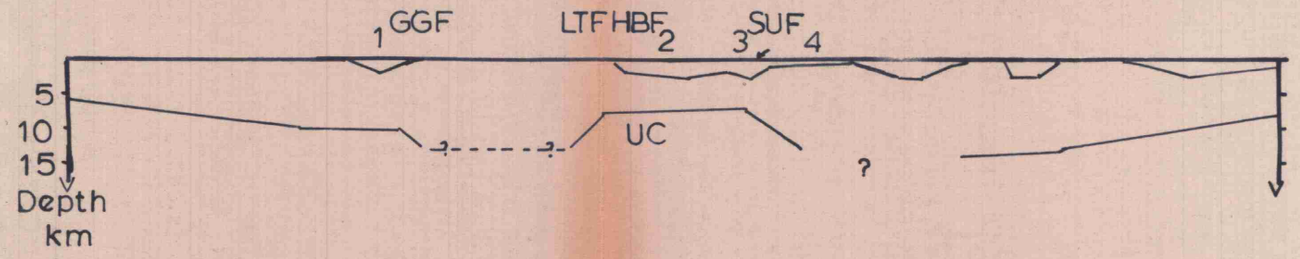
ORDNANCE SURVEY OF GREAT BRITAIN

GEOLOGICAL SURVEY OF GREAT BRITAIN (SCOTLAND)

SHEET 14


W. Lon. 5°20'
W. Lon. 3°40'
PERTHSHIRE
AYRSHIRE
ARGYLLSHIRE
DUMBARTONSHIRE
RENFREWSHIRE
LANARKSHIRE
STIRLINGSHIRE
SOUND OF BUTE
KILBRANNAN SOUND
FIRTH OF CLYDE
LOCH KATRINE
Loch Lomond
Loch Goil
Loch Long
Loch Striven
Loch Fyne
Loch Tarbert
Loch Ranza
Loch Riddon
Loch Ruel
Loch Eck
Loch Gilp
Loch Awe
Loch Etive
Loch Leven
Loch Linnhe
Loch Sunart
Loch Shiel
Loch Arkaig
Loch Lochy
Loch Ness
Loch Tay
Loch Earn
Loch Voil
Loch Lubnaig
Loch Venachar
Loch Achray
Loch Vennachar
Loch Katrine
Loch Arklet
Loch Chon
Loch Ard
Loch Dhu
Loch Lomond
Loch Arthur
Loch Humphry
Loch Long
Loch Goil
Loch Striven



VERTICAL EXAGGERATION 4:1

Fig. 2

Cross section of the major (crustal) structure
(LISPB, 1977)

GGF Great Glen Fault LTF Loch Tay Fault

HBF Highland Boundary Fault SUF Southern Uplands Fault

UC Upper Crust

1 Cromarty and Moray (Old Red Sandstone)

2 Midland Valley (Old Red Sandstone/Lower Carboniferous)

3 Midlothian Coalfild (Upper and Lower Carboniferous)

4 Southern Uplands

200000 300000 400000

700000 700000

600000 600000

500000 500000

200000 400000

ALOMARI, M.I. (Detailed) (1977)

ALOMARI, M.I. (Semi-detailed) (1978/79)

BOTT, M.H.P. and MASSON-SMITH, D. (1960)

EL-BATROUKH, S.I. (1975)

COTTON, W.R. (1968)

HIPKIN, R.G. and LAGIOS, E. (1979)

INSTITUTE OF GEOLOGICAL SCIENCES (1966/67)

MANSFIELD, J. and KENNETT, P. (1963)

McLEAN, A.C. (1961, 1966, 1975)

PARSLOW, G.R. and RANDALL, B.A. (1973)

POWELL, D.W. (1960-1970, 1973-1975)

QURESHI, I.R. (1961, 1970)

AL-SALMAN, S.H.A. (1974)

TUSON, J. (1959)

WALKER, J (1969)

Fault

HBF Highland Boundary Fault

SUF Southern Uplands Fault

Fig. 3

DATA-BASE
AUTHORS AND LOCATIONS

0 10 20 30 40 50kms

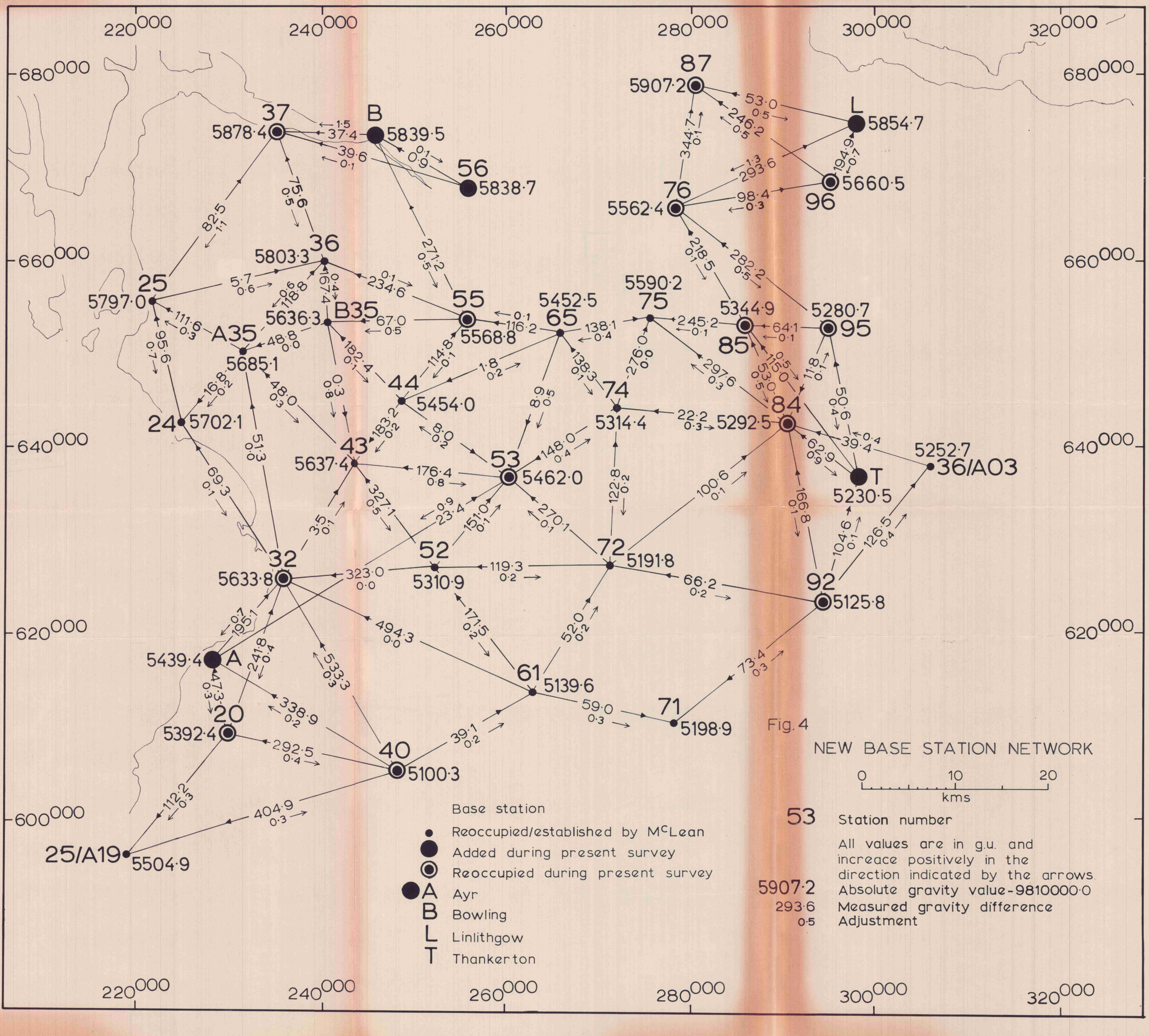

220000
240000
260000
280000
300000
320000
680000
660000
640000
620000
600000
87
5907·2
L
5854·7
76
5562·4
96
5660·5
37
5878·4
B
5839·5
56
5838·7
36
5803·3
25
5797·0
55
5568·8
B35
5636·3
A35
5685·1
65
5452·5
75
5590·2
5344·9
85
5280·7
95
44
5454·0
74
5314·4
84
5292·5
24
5702·1
43
5637·4
53
5462·0
5252·7
36/A03
T
5230·5
52
5310·9
72
5191·8
32
5633·8
92
5125·8
A
5439·4
61
5139·6
20
5392·4
71
5198·9
40
5100·3
25/A19
5504·9
Base station
Reoccupied/established by McLean
Added during present survey
Reoccupied during present survey
A Ayr
B Bowling
L Linlithgow
T Thankerton
NEW BASE STATION NETWORK
0 10 20
kms
53 Station number
All values are in g.u. and increace positively in the direction indicated by the arrows
5907·2 Absolute gravity value-9810000·0
293·6 Measured gravity difference
0·5 Adjustment

Fig. 4

180000 200000 220000 240000 260000 280000 300000 320000 340000

700000 680000 660000 640000 620000 600000 580000 560000 540000

HBF DWF IGF SUF OF

Fig. 5

BOUGUER GRAVITY ANOMALY MAP OF THE WESTERN MIDLAND VALLEY OF SCOTLAND AND FIRTH OF CLYDE.

0 10 20
kms

— 5 — ISOGAL VALUES IN MILLIGAL
THICK LINES AT 5 MGAL INTERVAL (50G.U.)
THIN LINES NORMALLY AT 1 MGAL INTERVAL (10G.U.)

ANOMALY "HIGH"
DIRECTION OF HACHURES INDICATES NATURE OF LOCAL CLOSURES

ANOMALY "LOW"

BOUGUER ANOMALIES CALCULATED AGAINST THE INTERNATIONAL GRAVITY FORMULA, 1967 AND REFERRED TO THE NATIONAL GRAVITY REFERENCE NET, 1973

DENSITIES (kg m^{-3}) FOR BOUGUER CORRECTIONS - SEE TEXT

TERRAIN CORRECTIONS APPLIED TO LAND OBSERVATIONS FOR TOPOGRAPHY WITHIN A RADIUS OF 22km OF THE STATIONS

— · — FAULT
DWF DUSK WATER FAULT
HBF HIGHLAND BOUNDARY FAULT
IGF INCHGOTRICK FAULT
OF OCHIL FAULT
SUF SOUTHERN UPLANDS FAULT

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
Ki
Gl
Ha
La
Ba
Tr

HBF
OF
DWF
IGF
SUF
FoC

A
A'
B
C
D
E

0·25
0·50
0·75
1·0

Fig. 6

DEPTHS TO HURLET BELOW O.D. (Newlyn)

0 10 20
Kms

— · — Fault

DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde

A,B, C,D, E,A' — Locations of gravity areas refered to in text.

— 0.5 — Contour Interval 0.25 km

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
Ki
HBF
A
1·0
OF
E
3·0
1·0
2·0
D
Ba
3·0
Gl
4·0
Ha
C
1·0
0·25
A'
La
DWF
0·5
O
Tr
FoC
IGF
2·5
1·5
0·5
SUF

Fig. 7

SUPRA-HURLET SEDIMENTS
GRAVITY COMPONENT

0 10 20
Kms

— · — Fault
DWF Dusk Water Fault
HBF Highland Boundary Fault
IGF Inchgotrick Fault
OF Ochil Fault
SUF Southern Uplands Fault

Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde

A,B
C,D
E,A'
Locations of gravity areas refered to in text.

—·— Contour Interval 0·25 m Gal (25g.u.)

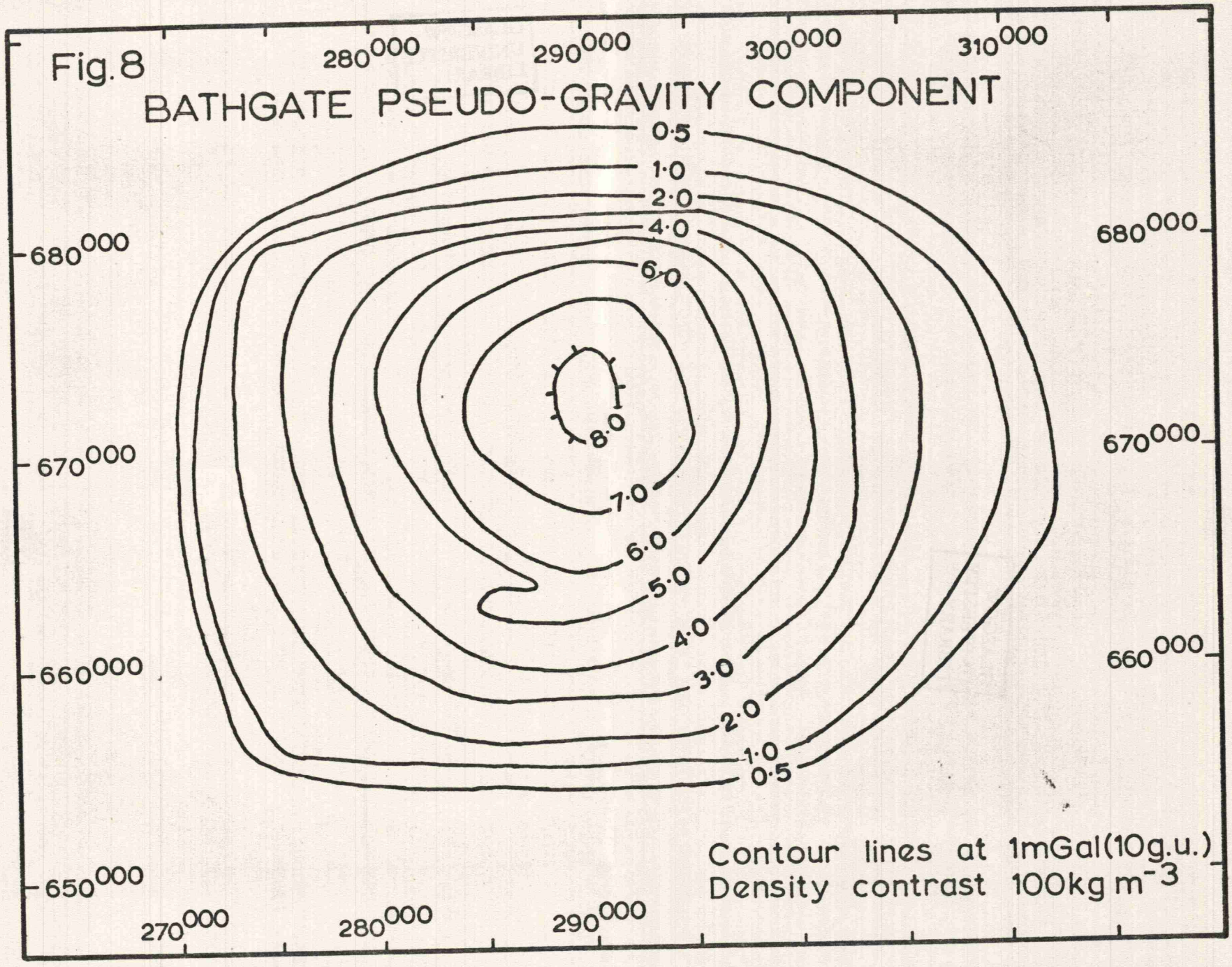


Fig.8
BATHGATE PSEUDO-GRAVITY COMPONENT
280000
290000
300000
310000
680000
670000
660000
650000
270000
0·5
1·0
2·0
4·0
6·0
8·0
7·0
6·0
5·0
4·0
3·0
2·0
1·0
0·5
Contour lines at 1mGal(10g.u.)
Density contrast 100kg m-3

AEROMAGNETIC MAP OF PART OF GREAT BRITAIN & NORTHERN IRELAND

SHEET 11

GEOLOGICAL SURVEY
OF
GREAT BRITAIN

Scale-1:250,000 or about Four Miles to One Inch

0 5 10 15 20 25 Miles
0 5 10 15 20 25 30 35 40 Kilometres

NATIONAL GRID
DIAGRAM EDITION

200,000 m E — 800,000 m N — 430,000 m E — 800,000 m N

5°00'W — 30' — 4°00'W — 30' — 3°00'W — 30' — 2°00'W

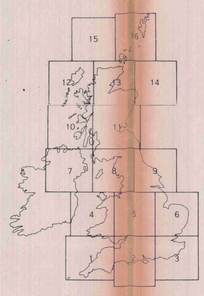
57°00'N — 30' — 56°00'N — 55°30'N

GLASGOW AREA
(not mapped)

600,000 m N — 200,000 m E — 600,000 m N — 430,000 m E

This sheet covers part of the large area flown between 1959 and 1963 under contract by Canadian Aero Service, Ltd., or by Hunting Surveys, Ltd.

Compiled in Geophysics Department, Geological Survey of Great Britain.
W. Bullerwell, Chief Geophysicist. Published 1968.
K. C. Dunham, D.Sc., F.R.S., Director, Institute of Geological Sciences incorporating the Geological Survey of Great Britain, the Museum of Practical Geology and Overseas Geological Surveys.



Contour values represent total force magnetic anomalies in gammas above a linear field equation for the British Isles, which implies a regional increase in total force of 2·1728 gammas per km. northwards and 0·159 gammas per km. westwards (National Grid directions) and a datum value of 47033 gammas at the grid reference origin for epoch 1955·5

Contour interval normally 10 gammas with thicker lines at 50 gammas. Larger interval in some complex areas, as indicated.

Flight traverse separation 2 km. or closer, with tie lines 10 km. or closer. Mean terrain clearance approximates to 1000 feet.

Stippled areas indicate central regions of local magnetic "lows" Unstippled closures denote local "highs"

Made to the master copy stage by the Director General of the Ordnance Survey, Southampton, 1968, for the Institute of Geological Sciences.

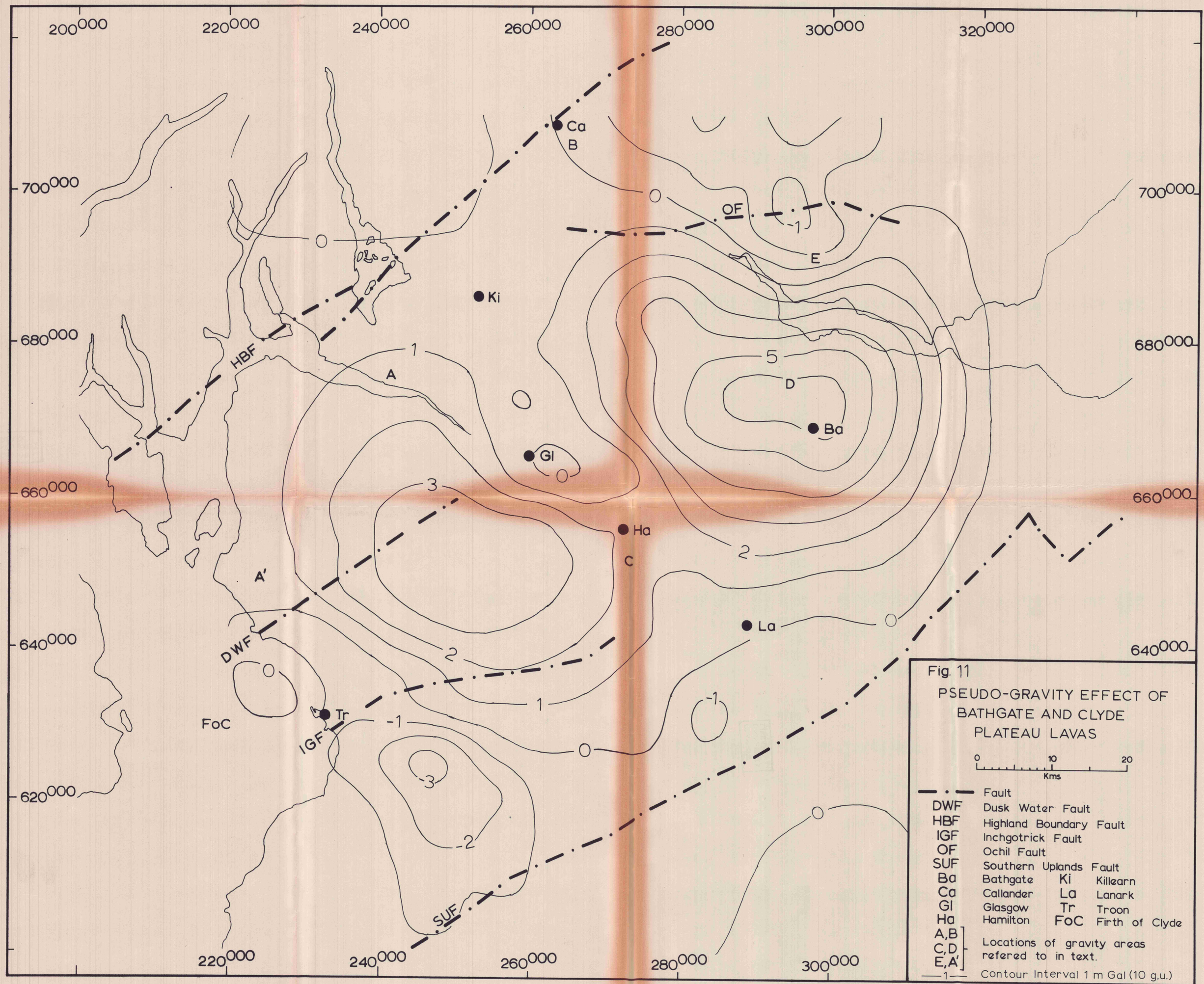


Fig. 11

PSEUDO-GRAVITY EFFECT OF BATHGATE AND CLYDE PLATEAU LAVAS

0 10 20
Kms

	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—1—	Contour Interval 1 m Gal (10 g.u.)		

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
Ki
Gl
Ha
La
Ba
Tr
A
C
D
E
A'
HBF
OF
DWF
IGF
SUF
FoC

0·25
0·5
0·75
1·0
1·25
1·5
2·0
2·5

Fig.12

THICKNESS MAP
OF
CLYDE PLATEAU LAVAS

0 10 20
Kms

Fault — C.P.L outcrops

DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde

A,B, C,D, E,A' — Locations of gravity areas refered to in text.

—0·5— Contour lines at 0·25 km interval

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
OF
E
Ki
0·50
HBF
A
3·0
D
2·5
Ba
1·0
Gl
1·5
2·0
0·75
1·5
Ha
1·0
C
A'
0·5
0·25
La
DWF
FoC
Tr
IGF
SUF

Fig. 14

CALCULATED BASE OF THE CLYDE PLATEAU LAVAS AND BATHGATE

0 10 20
Kms

Fault

DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde

A,B, C,D, E,A' — Locations of gravity areas refered to in text.

·25 — Contour Interval 0·25 Km

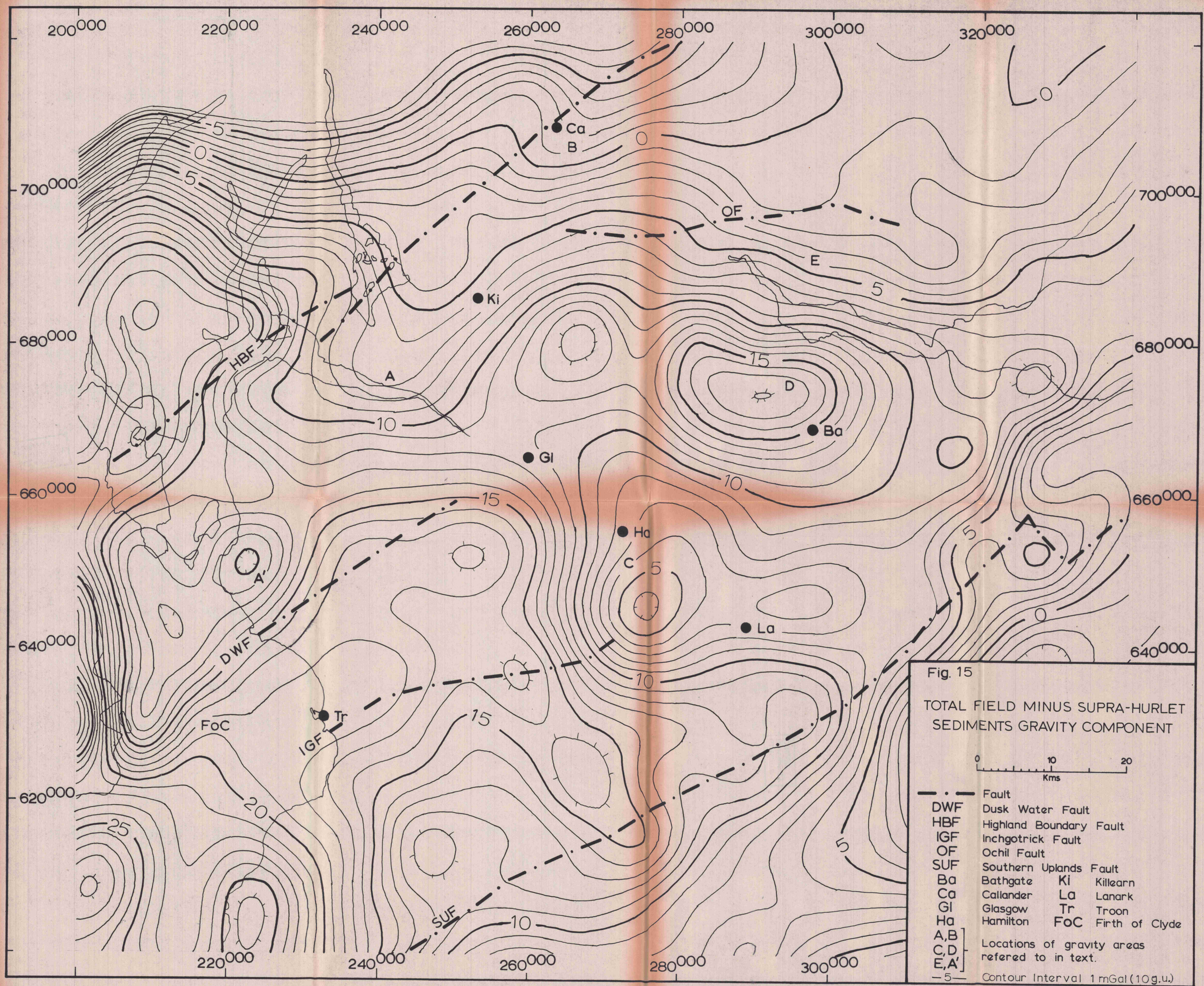


Fig. 15

TOTAL FIELD MINUS SUPRA-HURLET SEDIMENTS GRAVITY COMPONENT

0 10 20
Kms

— · — Fault

DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde

A,B / C,D / E,A' — Locations of gravity areas refered to in text.

—5— Contour Interval 1 mGal (10 g.u.)

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

-5 0 5 10 15 20

Ca B Ki A HBF OF E D Ba Gl Ha C A' La DWF FoC Tr IGF SUF

Fig. 16

TOTAL FIELD MINUS SUPRA-HURLET SEDIMENTS MINUS CLYDE PLATEAU LAVAS COMPONENTS

0 10 20 Kms

— · — Fault

DWF Dusk Water Fault

HBF Highland Boundary Fault

IGF Inchgotrick Fault

OF Ochil Fault

SUF Southern Uplands Fault

Ba Bathgate Ki Killearn

Ca Callander La Lanark

Gl Glasgow Tr Troon

Ha Hamilton FoC Firth of Clyde

A,B C,D E,A' Locations of gravity areas refered to in text.

—5— Contour Interval 1 m Gal (10 g.u.)

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

-5 -5 0 5 10 15

Ca B Ki Gl Ha C La Ba D E A A' Tr

HBF OF DWF IGF SUF FoC

Fig. 17

3rd. ORDER SURFACE FITTING

0 10 20 Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—1—	Contour Interval 1 m Gal (10 g.u.)		

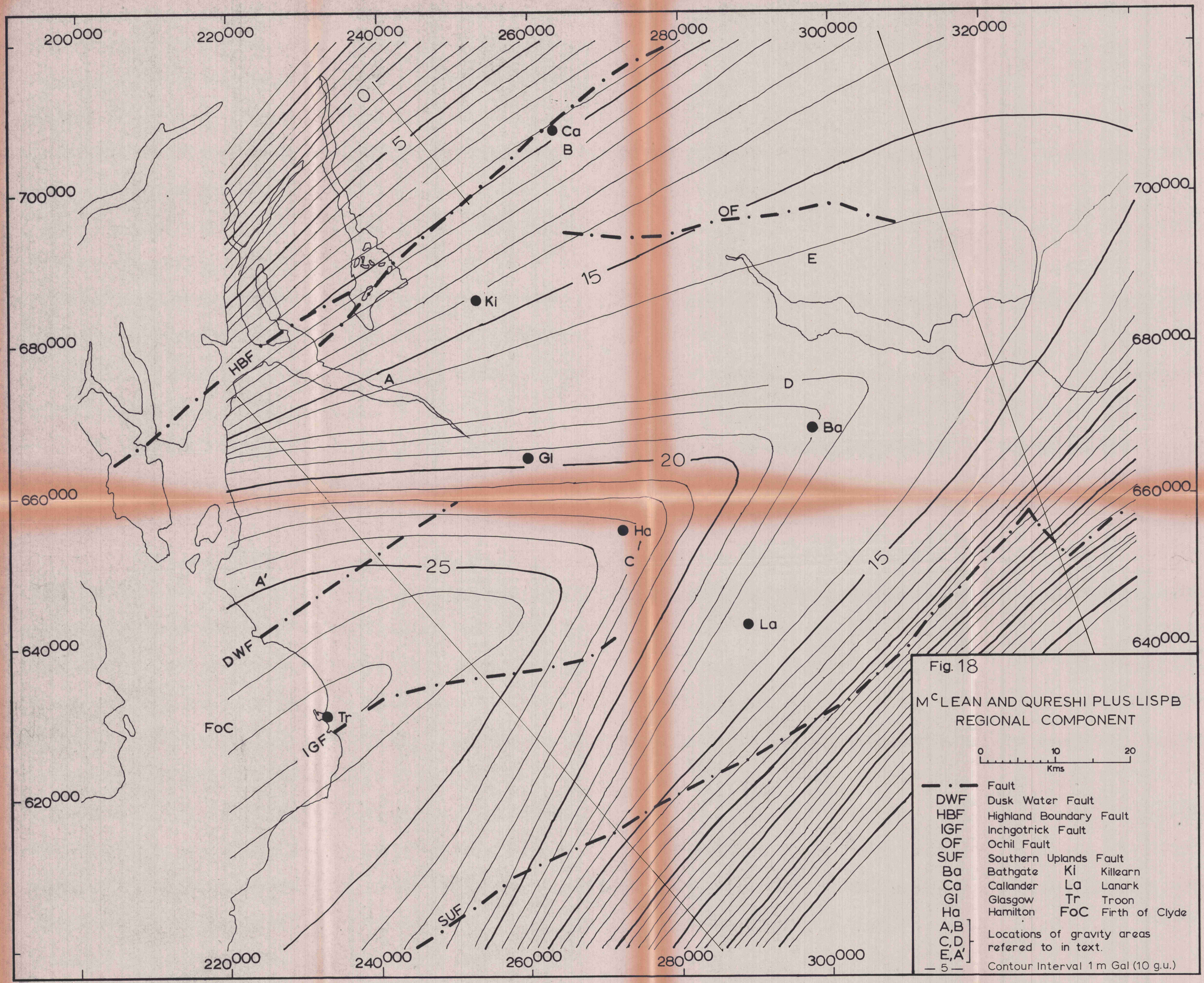


Fig. 18

M^cLEAN AND QURESHI PLUS LISPB REGIONAL COMPONENT

0 10 20
Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
— 5 —	Contour Interval 1 m Gal (10 g.u.)		

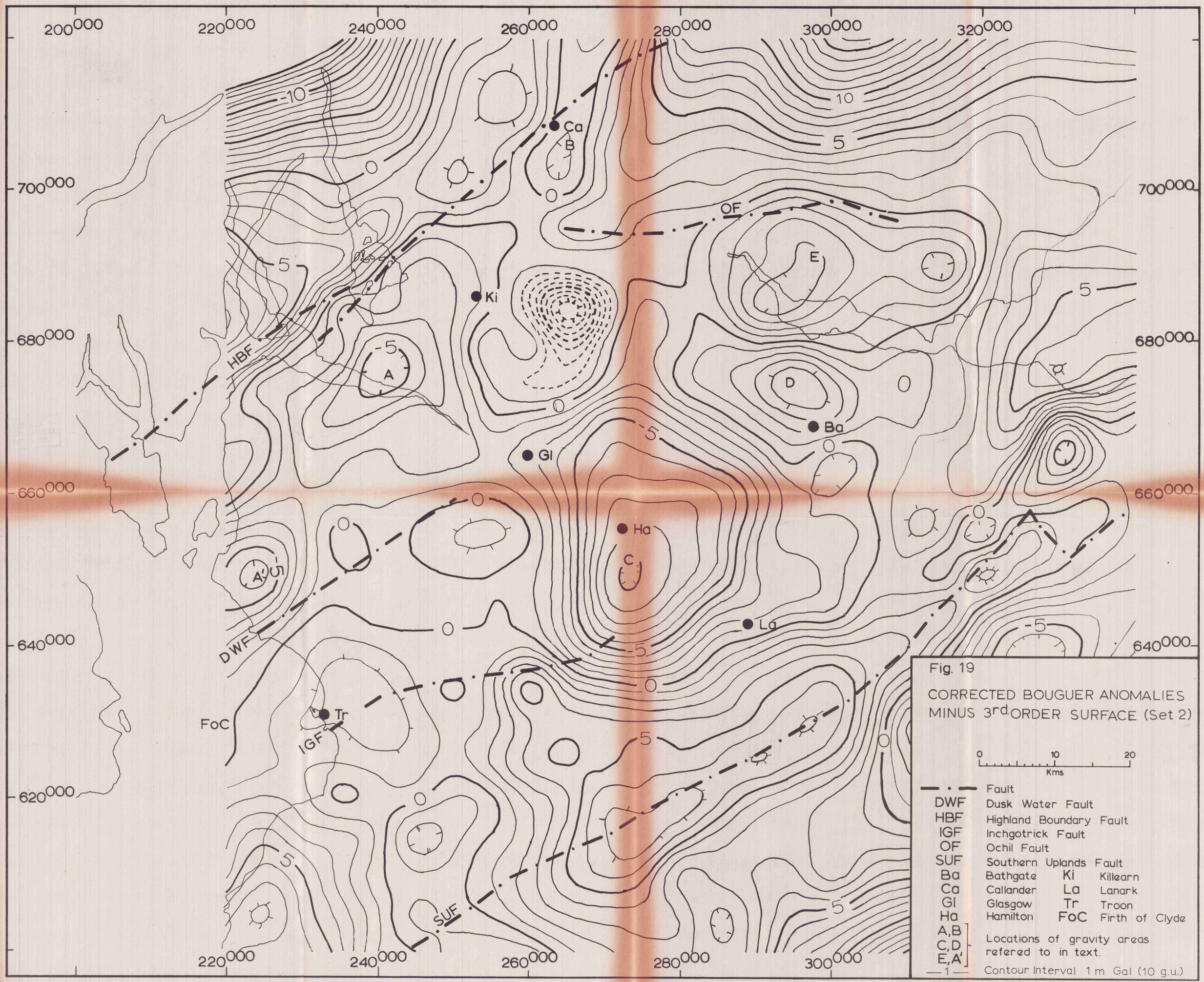


Fig. 19

CORRECTED BOUGUER ANOMALIES MINUS 3rd. ORDER SURFACE (Set 2)

0 10 20 Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—1—	Contour Interval 1 m Gal (10 g.u.)		

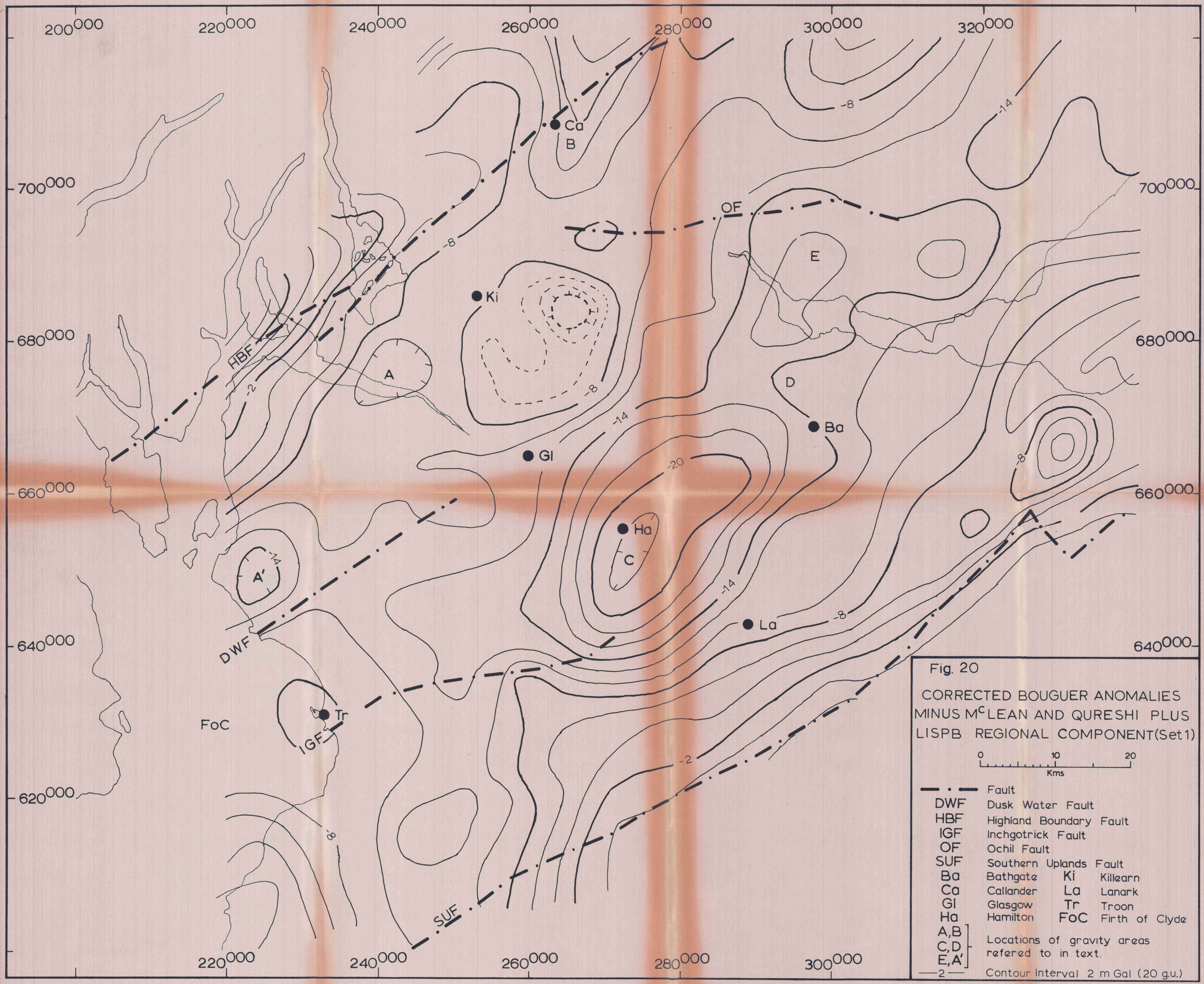


Fig. 20

CORRECTED BOUGUER ANOMALIES MINUS M^{c}LEAN AND QURESHI PLUS LISPB REGIONAL COMPONENT(Set 1)

0 10 20
Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—2—	Contour Interval 2 m Gal (20 g.u.)		

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
Ki
A
HBF
-8
-14
OF
E
D
Ba
Gl
-20
Ha
C
A'
DWF
La
FoC
Tr
IGF
-2
4
SUF

Fig. 21

CORRECTED BOUGUER ANOMALIES MINUS McLEAN AND QURESHI PLUS LISPB REGIONAL COMPONENT

0 10 20
Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—4—	Contour Interval 1 m Gal (10 g.u.)		

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca Ki Gl Ha La Ba Tr

HBF DWF IGF SUF OF

A A' B C D E FoC

Fig. 22

DENSITY MODEL (Set1) DEPTHS TO THE BASE OF OLD RED SANDSTONE

0 10 20 Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—1—	Contour Interval 1 m Gal (10 g.u.)		

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
Ki
Gl
Ha
C
La
Tr
FoC
Ba
A
A'
D
E

HBF
OF
DWF
IGF
SUF

Fig. 23

THICKNESS MAP OF OLD RED SANDSTONE (Set 1)

0 10 20 Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—1—	Contour Interval 1 Km		

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
Ki
Gl
Ha
C
La
Ba
D
E
A
A'
FoC
Tr

HBF
OF
DWF
IGF
SUF

1·0
2·0
3·0
4·0
5·0
6·0
7·0
8·0
2·5
0·75

Fig. 24

DENSITY MODEL (Set 2) DEPTHS TO THE BASE OF OLD RED SANDSTONE

0 10 20
Kms

— · — Fault

DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde

A,B
C,D
E,A'
Locations of gravity areas refered to in text.

—5.0— Contour Interval 1·0 km

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
Ki
Gl
Ha
C
La
Ba
Tr
FoC
A
A'
D
E

HBF
DWF
IGF
OF
SUF

3·0 2·0 1·0 5·0 4·0 6·0 0·75

Fig. 25

THICKNESS MAP OF OLD RED SANDSTONE (Set 2)

0 10 20
Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—4.0—	Contour Interval 1.0 km		

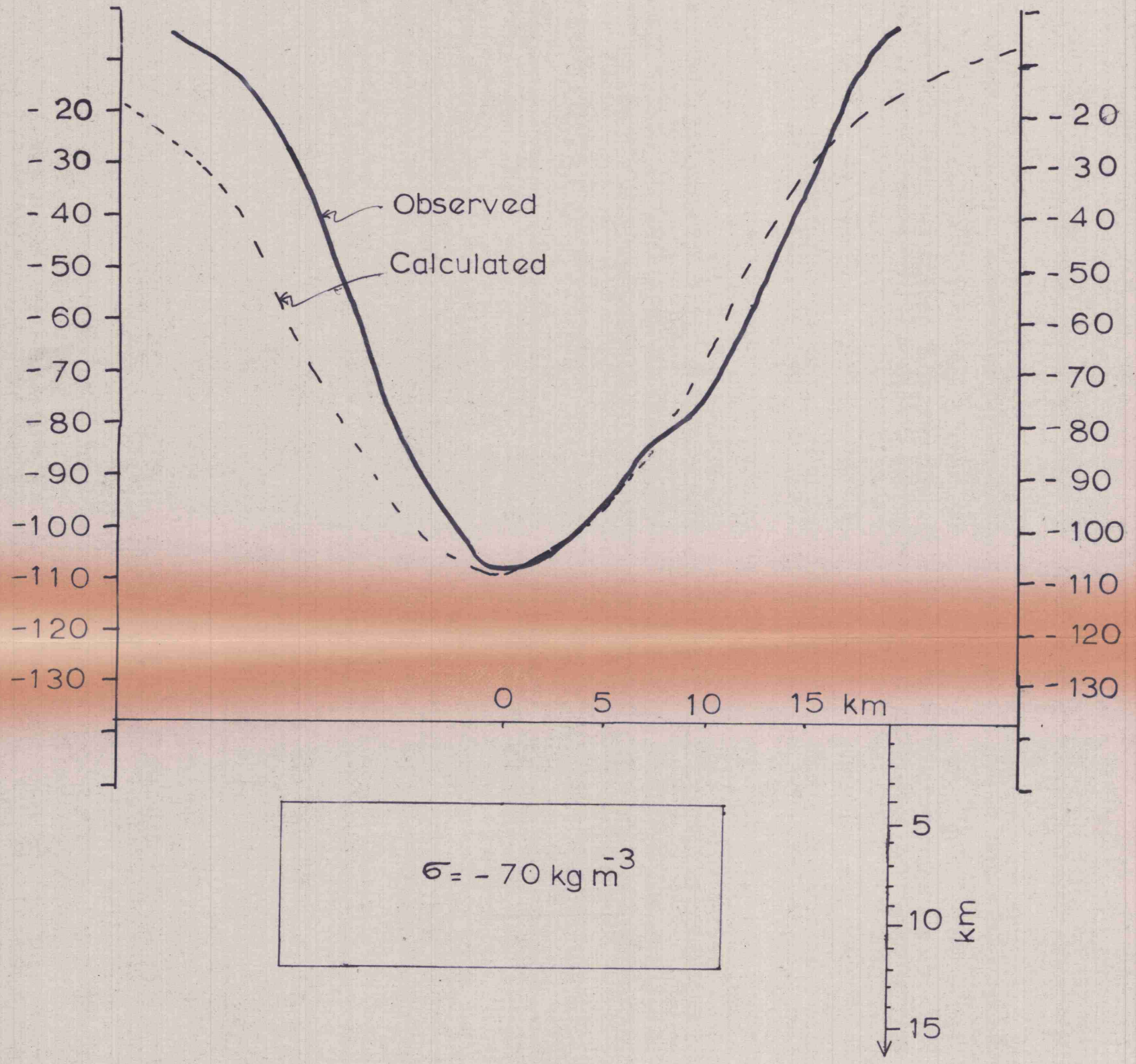


Fig. 26

CYLINDRICAL MODEL FOR LOW C

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

0 5 10 15 20 25

Ca Ki Gl Ha La Ba Tr

A B C D E A'

HBF OF LISPB MC + Q DWF IGF SUF

FoC

Fig. 27

McLEAN AND QURESHI PLUS LISPB REGIONAL COMPONENT (REVISED)

0 10 20 Kms

— · —	Fault		
DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde
A,B C,D E,A'	Locations of gravity areas refered to in text.		
—5—	Contour Interval 1m Gal (10g.u.)		

200000 220000 240000 260000 280000 300000 320000

700000 680000 660000 640000 620000

Ca
B
Ki
Gl
Ha
C
La
Tr
Ba
D
E
A
A'
FoC

HBF
DWF
IGF
OF
SUF

4
-2
-8
-14
-20

Fig. 28

CORRECTED BOUGUER ANOMALIES MINUS McLEAN AND QURESHI PLUS LISPB REGIONAL COMPONENT (REVISED)

0 10 20
Kms

— · — Fault

DWF	Dusk Water Fault		
HBF	Highland Boundary Fault		
IGF	Inchgotrick Fault		
OF	Ochil Fault		
SUF	Southern Uplands Fault		
Ba	Bathgate	Ki	Killearn
Ca	Callander	La	Lanark
Gl	Glasgow	Tr	Troon
Ha	Hamilton	FoC	Firth of Clyde

A,B
C,D
E,A'
Locations of gravity areas refered to in text.

—4— Contour interval 1 m Gal (10 g.u.)

Fig. 29 GRAVITY STATIONS IN THE MIDLAND VALLEY OF SCOTLAND 930 USED BY ALOMARI

COMPILATION BY ALOMARI

SCALE 1:253440
3.95 MM REPRESENT ONE KM
4.00 MILES ARE REPRESENTED BY ONE INCH

LINPOINT PROGRAM BY A. MORRISON, GEOGRAPHY

SCALE 1:253440
3.95 MM REPRESENT ONE KM
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SCALE 1:253440
3.95 MM REPRESENT ONE KM
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LINPOINT PROGRAM BY A. MORRISON, GEOGRAPHY

National Grid

1km 200 meters each